

WHAT IS CLAIMED IS:

1. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

a light source generating a set of primary colors; and

a controller combining the set of primary colors to substantially reproduce the transmission spectra.

2. The display of claim 1 comprising a correction filter, the spectrum of the correction filter being based on the spectrum reflected from a type of printing substrate.

3. The display of claim 1 comprising a correction filter, the spectrum of the correction filter being based on the spectrum of an intended light used to view the printed matter.

4. The display of claim 1 wherein the light source includes at least a plurality of LEDs.

5. The display of claim 1, wherein the light source includes at least a color wheel.

6. The display of claim 1, wherein the light source includes at least four

colors.

7. The display of claim 1, wherein the light source produces three primary colors.

8. The display of claim 1 comprising at least two color wheels.

9. The display of claim 1 comprising at least two light sources each generating a set of primary colors.

10. The display of claim 1 comprising a spatial light modulator.

11. The display of claim 1 comprising a digital micro-mirror device.

12. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

a light source means generating a set of primary colors; and

a controller means combining the set of primary colors to substantially reproduce the transmission spectra.

13. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are

produced, the display comprising:

a light source generating a set of primary colors, the light source including at least a color wheel, the color wheel having at least four primary colors; and

a controller combining the set of primary colors to substantially reproduce the transmission spectra.

14. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

at least two light sources each generating a set of primary colors, each light source including at least a color wheel; and

a controller combining the set of primary colors to substantially reproduce the transmission spectra.

15. A method for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the method comprising:

accepting data corresponding to the image of the printed matter;

for each of a plurality of primaries determining the proportion of that primary to display in order to substantially reproduce at least one of the transmission spectra; and

displaying the set of primaries.

16. The method of claim 15 comprising converting the data corresponding to the image to intermediate data corresponding to the set of transmission spectra.

17. The method of claim 15 wherein the data corresponding to the image represents the proportions of the inks, the method comprising converting the input data corresponding to the image to intermediate data corresponding to the set of transmission spectra; wherein the step of determining the proportion of the primary includes at least converting data from the set of transmission spectra using a matrix.

18. The method of claim 15 comprising converting the data corresponding to the image to a set of data determining the proportion of the primaries using Demichel equations.

19. The method of claim 15 comprising converting the data corresponding to the image to intermediate data corresponding to the set of transmission spectra using a matrix.

20. The method of claim 15 comprising, for each of the transmission spectra, reproducing the spectra using a set of proportions of the primaries.

21. The method of claim 15 comprising passing light through a correction filter, the spectrum of the correction filter being based on the spectrum reflected from a type of printing substrate.

22. The method of claim 15 comprising passing light through a correction filter, the spectrum of the correction filter being based on the spectrum of an intended light source used to view the printed matter.

23. The method of claim 15, wherein the step of displaying the set of primaries includes at least producing light using a plurality of LEDs.

24. The method of claim 15 comprising passing light through a color wheel.

25. The method of claim 15 wherein the plurality of primaries includes at least four colors.

26. The method of claim 15, wherein the plurality of primaries includes three colors.

27. The method of claim 15, wherein the primaries are disposed on at least two color wheels.

28. The method of claim 15 comprising displaying the set of primaries using at least two light sources each generating a set of primary colors.

29. The method of claim 15 comprising passing the set of primaries through a spatial light modulator.

30. The method of claim 15 comprising passing the set of primaries through a

digital-micro mirror device.

31. The method of claim 15 comprising correcting for dot gain effect.

32. A method for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the method comprising:

accepting data corresponding to the image of the printed matter;

converting the data corresponding to the image to intermediate data corresponding to the set of transmission spectra;

for each of a plurality of primaries determining the proportion of that primary to display; and

displaying the set of primaries.

33. A method for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the method comprising:

accepting data corresponding to the image of the printed matter;

for each of at least four primaries determining the proportion of that primary to display; and

displaying the set of primaries.

34. A method for reproducing the image of printed matter, the printed matter

printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the method comprising:

accepting input data corresponding to the proportions of the inks in the image;

converting the input data to intermediate data corresponding to the set of transmission spectra;

for each of a set of primaries, determining the proportion of that primary to display using a matrix and the intermediate data; and

displaying the set of primaries.

35. A display for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

a light source generating a set of primary colors, wherein the spectrum of each of the primary colors is substantially similar to the one of the transmission spectra.

36. The display of claim 35 comprising a set of filters, wherein for each of the filters the spectrum of the filter is based on one transmission spectrum of the transmission spectra.

37. The display of claim 35 comprising a correction filter, the spectrum of the correction filter being based on the spectrum reflected from a type of printing

substrate.

38. The display of claim 35, wherein the printed material is meant to be displayed under an illumination condition, the display comprising an illumination correction filter, the spectrum of the illumination correction filter being based on the spectrum of the illumination condition.

39. The display of claim 35, wherein the light source includes at least a plurality of LEDs.

40. The display of claim 35, wherein the light source includes at least four colors.

41. A display for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

a light source generating a set of primary colors, wherein the spectrum of each of the primary colors is substantially similar to the one of the transmission spectra; and

a set of filters, for each of the filters the spectrum of the filter being based on one transmission spectrum of the transmission spectra.

42. A method for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, wherein when light is passed



through the inks when on the printing substrate a set of transmission spectra are produced, the method comprising:

accepting data corresponding to the image of the printed matter;  
for each of a plurality of primaries, each primary being substantially matched to one of the transmission spectra, determining the proportion of that primary to display; and  
displaying the set of primaries.

43. The method of claim 42, comprising projecting light through a set of filters, wherein for each of the filters the spectrum of the filter being based on one transmission spectrum of the transmission spectra.

45. The method of claim 42 comprising passing light through a correction filter, the spectrum of the correction filter being based on the spectrum reflected from a type of printing substrate.

45. The method of claim 42, wherein the printed material is meant to be displayed under an illumination condition, the method comprising passing light through an illumination correction filter, the spectrum of the illumination correction filter being based on the spectrum of the illumination condition.

46. The method of claim 42 comprising passing light through a color wheel including at least four colors.

47. A device for soft proofing image data for printed material, the device

comprising:

- (a) a light source for producing light having at least four primary colors;
- (b) a converter for converting the image data to at least one of said at least four primary colors according to at least one characteristic of the printed material to form converted data;
- (c) a controller for determining a proportion at least one of said at least four primary colors according to said converted data for production by said light source; and
- (d) a viewing screen for displaying the image data according to said proportion from said controller.

48. The device of claim 47, further comprising:

- (e) a projector for projecting light of said at least four primary colors onto said viewing screen according to said proportion.

49. The device of claim 47, wherein said light source comprises:

- (i) a polychromatic source; and
- (ii) at least four color filters, each color filter corresponding to an ink transmission spectra.

50. The device of claim 47, wherein said projector comprises a spatial light modulator for determining a path of light of each primary color.

51. The device of claim 47, wherein said light source comprises a continuously variable neutral density filter for controlling brightness of said light of said at least

four primary colors.

52. The device of claim 47, wherein said at least one characteristic of the printed material is determined according to a transmission spectrum of a combination of inks.

53. The device of claim 47, wherein said light source for producing light having at least four primary colors is selected such that a spectrum of said light having at least four primary colors is matched to said at least a portion of a spectrum of a combination of inks.

54. The device of claim 47, wherein said at least one characteristic of the printed material is determined according to a color reflection characteristic of a material for receiving said combination of inks.

55. The device of claim 47, wherein said at least one characteristic of the printed material is determined according to a spectrum of a combination of inks, and wherein a brightness of said light having at least four primary colors is adjusted according to illumination conditions for said material for receiving said combination of inks.

56. The device of claim 47, further comprising a white light source for producing white light, wherein said illumination conditions are adjusted according to an amount of said white light being produced.

57. The device of claim 47, further comprising:

- (e) a polychromatic light source; and
- (f) a plurality of filters for filtering light from said polychromatic light source for producing said light having at least four primary colors;

wherein said at least one characteristic of the printed material is also determined according to a spectrum of at least one ink, and said filtered light is adjusted according to a density of said at least one ink compared to said filters.

58. The device of claim 47, wherein a saturation of said light having at least four primary colors is adjusted according to a gloss of said material, said material for receiving at least one ink.

59. In a device for soft proofing image data for printing, the device comprising a light source for producing light having at least four primary colors, a converter for converting the image data to a proportion of at least one of said at least four primary colors according to at least one characteristic of the printed material to form converted data, and a viewing screen for displaying the image according to the converted data, a method for creating the image for displaying, the method comprising the steps of:

- (a) determining at least one characteristic of the printed material according to at least one of a spectrum of a set of inks and a color reflection characteristic of a material for receiving said set of inks;
- (b) producing light by the light source of at least four primary colors;
- (c) determining a path for light of each primary color according to the converted data; and

(d) projecting said light of each primary color according to said path onto the viewing screen to form the image.

60. A method for soft proofing image data of a plurality of colors for printing to form printed material, comprising the steps of:

- (a) providing a color system for printing the printed material, said color system featuring a plurality of colored materials, each colored material being subtractive, such that said colored material has a color by blocking at least a portion of a spectrum of light impinging on said colored material;
- (b) producing light of at least four colors for electronically displaying the image data;
- (c) combining light of a plurality of said colors to reproduce each color of each colored material for electronically displaying the image data, said light of said plurality of colors being combined additively to form a combination; and
- (d) displaying the image data with said combination of said light of said plurality of colors.

61. The method of claim 60, wherein each color of said light is substantially spectrally matched to each color of said colored materials.

62. The method of claim 60, wherein step (b) is performed with a projective light system, said projective light system featuring a light source for producing said light of at least four colors, and a viewing screen for receiving said light for displaying the image.

63. In a device comprising a light source for producing light having at least four primary colors and a viewing screen, a method for soft proofing subtractive image data of a plurality of colors, the method comprising the steps of:

- (a) determining a spectrum for each of the plurality of colors of the subtractive image data;
- (b) matching said spectrum to spectra of a plurality of the light having at least four primary colors;
- (c) producing light corresponding to said spectrum through an addition of the light of at least two primary colors from the light source; and
- (d) displaying image data on the viewing screen with said light of step (c).

64. A method for reproducing the image of printed matter printed using a set of inks, the inks when on the printing substrate producing a set of transmission spectra, the method comprising:

accepting data corresponding to the image;

for each of a plurality of primaries, each primary being substantially matched to a spectrum produced by the set of inks, determining the proportion of that primary to display; and

projecting light through a set of filters.

65. A method for reproducing the image of printed matter printed using a set of inks, the inks when on the printing substrate producing a set of transmission spectra, the method comprising:

accepting data corresponding to the image;

for each of at least six primaries, each primary being substantially matched

to a spectrum produced by the set of inks, determining the proportion of that primary to display; and

projecting light through a set of filters.

66. A method for reproducing the image of printed matter, the printed matter printed on paper using a set of inks, the inks when on the paper producing a set of transmission spectra, the method comprising:

accepting data corresponding to the image of the printed matter;  
for a plurality of primaries determining the proportion of each primary so as to substantially reproduce each of the set of transmission spectra; and  
displaying the set of primaries.

67. A method for reproducing the image of printed matter, the printed matter printed on printing substrate using a set of inks, the inks when on the printing substrate producing a set of transmission spectra, the method comprising:

accepting data corresponding to the image of the printed matter;  
for at least six primaries determining the proportion of each primary so as to substantially reproduce each of the set of transmission spectra; and  
displaying the set of primaries.

68. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

at least two light sources each generating a set of primary colors, each light

source including at least a color wheel and a spatial light modulator; and

a controller combining the set of primary colors to substantially reproduce the transmission spectra.

69. A display for reproducing the image of printed matter, the printed matter printed on a printing substrate using a set of inks, wherein when light is passed through the inks when on the printing substrate a set of transmission spectra are produced, the display comprising:

a light source generating three primary colors, the light source including at least a color wheel and a spatial light modulator; and

a controller combining the three primary colors to substantially reproduce the transmission spectra.

70. A method for reproducing the image of printed matter, the printed matter printed on printing substrate with a set of inks, using a print system, the method comprising:

accepting data corresponding to the image of the printed matter;

altering the data based on print effects or based on the characteristics of the print system;

for each of a plurality of primaries determining the proportion of that primary to display; and

displaying the set of primaries.

71. The method of claim 70 comprising converting the data corresponding to the image to intermediate data corresponding to a set of transmission spectra



produced when light passes through the inks when on the printing substrate.

72. The method of claim 71 comprising passing light through a correction filter, the spectrum of the correction filter being based on the spectrum reflected from a type of printing substrate.

73. The method of claim 71 comprising passing light through a color wheel.

74. A method for reproducing the image of printed matter, the printed matter printed on printing substrate with a set of inks, using a print system, the method comprising:

accepting data corresponding to the image of the printed matter;

altering the data based on print effects or based on the characteristics of the print system;

converting the data to intermediate data corresponding to a set of transmission spectra produced when light passes through the inks when on the printing substrate;

for each of a plurality of primaries determining the proportion of that primary to display; and

displaying the set of primaries.